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LAND USE MAPPING AND MODELLING FOR THE PHOENIX QUADRANGLE

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Type I Progress Report

ERTS-1

1 July 1973 - 31 August 1973

- a. Land Use Mapping and Modelling for the Phoenix Quadrangle.
(ERTS-A Proposal SR-186)
- b. IN-057
- c. Statement and explanation of any impedance:

Nearly all impedances have been eliminated. Lack of recent aerial photography over the southern 10% of the Phoenix Quadrangle limits accuracy checks of ERTS interpretations.

- d. Accomplishments during the reporting period and those planned for the next period:

The MSS 9 x 9 image of the Phoenix metropolitan area taken on June 25, 1973 has been compared with the first MSS 9 x 9 of that area taken on August 23, 1972. Natural vegetation appears to be more lush in the June image. This could be attributed to the abnormally large amount of precipitation received so far this year and also because the image shows conditions two months earlier in the summer season. Reservoir levels are also higher in the 1973 image. The most noticeable land use changes have been the filling of Painted Rock Reservoir, which has resulted in the change of agricultural and rangeland to water in the southern portion of the test site and a major addition to the Sun City development, which has been expanding northward resulting in the change from agricultural land to urban land use.

Interpretation beyond the Level I classification being used has been proposed, but not all categories can be detected. Areas of sufficient size and contrast allow certain uses at the second and third levels to be delineated. The classification system used is described in U.S. Geological Survey Circular No. 671, "A Land-Use Classification System for Use With Remote-Sensor Data."

During the next reporting period, ERTS imagery should be received which will give complete coverage over the test site for an entire year. Retrospectively-ordered color composite imagery should also be received. These images will be examined to prepare a land use change update over the entire test site.

The existing data bank for the Phoenix Quadrangle will be updated to reflect the changes detected in the ERTS images. This will be done by computer card input to change only those cells affected by change during the period November 1970 through the winter of 1972-73.

e. Scientific results and practical applications:

Comparisons which have been made between MSS 9 x 9 images taken last August and June, 1973, confirmed earlier detected land use changes, but seasonal vegetation differences due to time and precipitation differences did not allow a true summer-to-summer comparison to be made. Receipt of mid-August 1973 imagery should provide latter year-to-year data for comparison purposes.

In comparing the land use changes detected from ERTS imagery with those detected from the November 1972 high-altitude aerial photography the greatest accuracy was obtained in the water classification, where interpretations were virtually identical. Land use changes from rangeland to agricultural land were normally detectable, although ERTS images did not always show new agricultural land which was not in crops. Land changing from agricultural to urban use presented more problems. Individual land units changing were usually smaller than the types previously mentioned. Lack of landscaping vegetation in newly developed residential areas often caused them to be overlooked during interpretation of ERTS images. However, the changes detected from ERTS did correspond to the more extensive changes noted on aerial photography. In the larger parcels and in those with landscaping vegetation present, the results were more than 90% accurate. ERTS is a useful tool in monitoring urban advance on the western Phoenix fringe.

The fact that most of the ERTS imagery which has been used to detect change was taken after the high altitude aerial photography was taken and also the lack of photography over the southern edge of the test site affects attempts to arrive at a precise accuracy statement.

Residential land can usually be delineated provided that landscaping vegetation is present. Three categories, commercial and services, industrial and institutional have appeared as a unit which could be delineated, but no separation of these categories from each other appears possible so far. Extractive can be delineated where open pit or strip mining is practiced and where trailings, dumps or ponds are visible on the imagery. In the transportation, communications, and utilities category, larger airports and railroad yards are usually the only mappable features. Highways, although often visible, are rarely delineated as land use categories because the corridor they occupy is below minimum mapping size. Citrus orchards can be delineated from cropland on some color composite images, although the accuracy of this separation is not yet sufficient for mapping purposes.

f. Published reports and talks:

None

g. Recommendations for improvement:

The generally consistent framing of land areas by ERTS has been very helpful when comparing data for specific locations over time. However, the June 25 ERTS images over Phoenix bisected the metropolitan area along an east-west axis. This was inconsistent with previous Phoenix images. Consistent framing of MSS images along the orbital track would be of substantial benefit.

h. Changes in Standing Order Forms:

None

i. ERTS Image Descriptor Forms:

No new descriptors have been detected.

j. Changed Data Request Forms Submitted to Goddard Space Flight Center/NDPF:

Two ERTS Data Request Forms were submitted to Goddard Space Flight Center/NDPF on August 1, 1973. MSS color infrared composite transparencies were ordered retrospectively.